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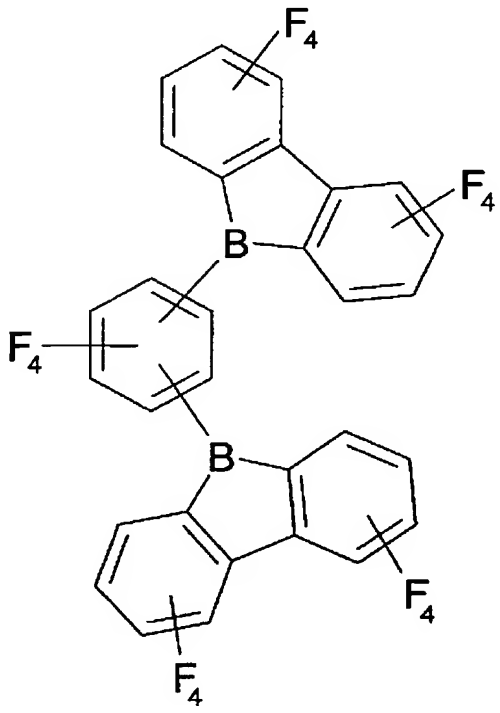
Application Number: 10/817,465
Response Dated: August 25, 2006
Office Action Dated March 1, 2006

LISTING OF THE CLAIMS

1. (original) A method for cationically polymerizing olefin monomer comprising the step of using a composition having the chemical structure:



as a coinitiator in the presence of water.

2. (original) The method of claim 1, wherein the chemical structure is:

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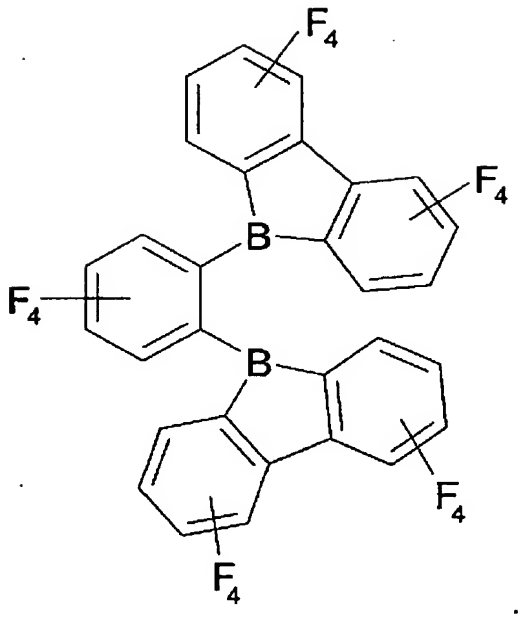

3. (original) The method of claim 1, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

4. (original) The method of claim 1, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

5. (original) The method of claim 1, wherein the olefin monomer is isobutene.

6. (original) The method of claim 1, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

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7. (original) A method for cationically polymerizing olefin monomer comprising the step of using a composition having the chemical structure:

RZn–R'–ZnR

as a coinitiator in the presence of water;

wherein each R is independently selected from the group consisting of a perfluorophenyl; 3,5-bis(trifluoromethyl)phenyl; 1-perfluoronaphthyl; 2-perfluoronaphthyl; 2-perfluorobiphenyl; 3-perfluorobiphenyl; 4-perfluorobiphenyl; and p-R"$_3$Si-2,3,5,6-tetrafluorophenyl;

wherein R' is 1,2-perfluorophenylenyl; 1,2-perfluoronaphthalenyl; 2,3-perfluoronapthalenyl; 1,8-perfluoronaphthalenyl; 1,2-perfluoroanthracenyl; 2,3-perfluoroanthracenyl; 1,9-perfluoroanthracenyl; 1,2-perfluorophenanthrenyl; 2,3-perfluorophenanthrenyl; 1,10-perfluorophenanthrenyl; 9,10-perfluorophenanthrenyl; 2,2'-perfluorobiphenylenyl; 2,2'-perfluoro-1,1'-binaphthalenyl; 3,3'-perfluoro-2,2'-binaphthalenyl; or 1,1'-ferrocenyl; and

wherein R" is a C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_8, C_9, or C_{10} alkyl.

8. (original) The method of claim 7, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, ,2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

9. (original) The method of claim 7, wherein the olefin monomer is a C_2 – C_{30} olefin or a C_2 – C_{30} diolefin.

10. (original) The method of claim 7, wherein the olefin monomer is isobutene.

11. (original) The method of claim 7, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

12. (currently amended) A method for cationically polymerizing olefin monomer comprising the step of using a composition having the chemical structure:

$$R_2Y–R'–YR_2$$

as a co-initiator in the presence of water ~~as a coinitiator in an organic phase or neat monomer reaction phase~~;

wherein Y is boron ~~or aluminum~~;

wherein each R is independently selected from the group consisting of a perfluorophenyl; 3,5-bis(trifluoromethyl)phenyl; 1-perfluoronaphthyl; 2-perfluoronaphthyl; 2-perfluorobiphenyl; 3-perfluorobiphenyl; 4-perfluorobiphenyl; and p-R''_3Si-2,3,5,6-tetrafluorophenyl;

wherein R' is 1,2-perfluorophenylenyl; 1,2-perfluoronaphthalenyl; 2,3-perfluoronapthalenyl; 1,8-perfluoronaphthalenyl; 1,2-perfluoroanthracenyl; 2,3-perfluoroanthracenyl; 1,9-perfluoroanthracenyl; 1,2-perfluorophenanthrenyl; 2,3-perfluorophenanthrenyl; 1,10-perfluorophenanthrenyl; 9,10-perfluorophenanthrenyl; 2,2'-perfluorobiphenylenyl; 2,2'-perfluoro-1,1'-binaphthalenyl; 3,3'-perfluoro-2,2'-binaphthalenyl; or 1,1'-ferrocenyl; and wherein R" is a C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_8, C_9, or C_{10} alkyl.

13. (original) The method of claim 12, wherein the chemical structure is:

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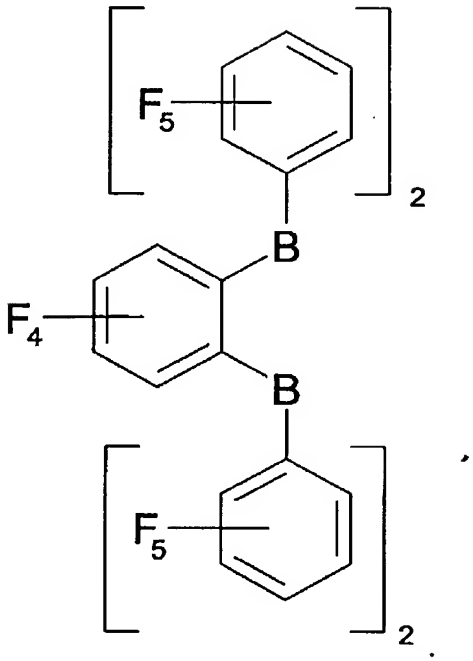

14. (original) The method of claim 12, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

15. (original) The method of claim 12, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

16. (original) The method of claim 12, wherein the olefin monomer is isobutene.

17. (original) The method of claim 12, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

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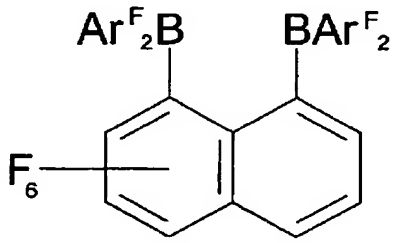
18. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F_2 = C_{12}F_8$ as a coinitiator in the presence of water.

19. (original) The method of claim 18, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

20. (original) The method of claim 18, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

21. (original) The method of claim 18, wherein the olefin monomer is isobutene.

22. (original) The method of claim 18, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

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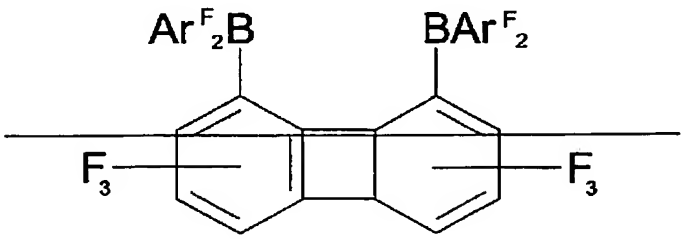
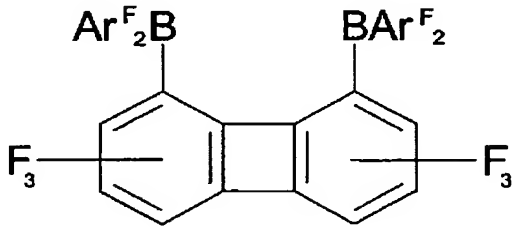
23. (currently amended) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:





wherein $Ar^F = C_6F_5$ or $Ar^F_2 = C_{12}F_8$ as a coinitiator in the presence of water.

24. (original) The method of claim 23, wherein the olefin monomer is selected from the group consisting of:

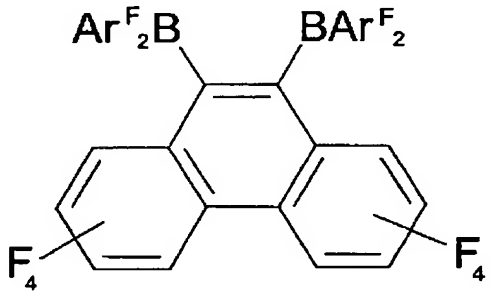
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

25. (original) The method of claim 23, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

26. (original) The method of claim 23, wherein the olefin monomer is isobutene.

27. (original) The method of claim 23, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

28. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F_2 = C_{12}F_8$ as a coinitiator in the presence of water.

29. (original) The method of claim 28, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

30. (original) The method of claim 28, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

31. (original) The method of claim 28, wherein the olefin monomer is isobutene.

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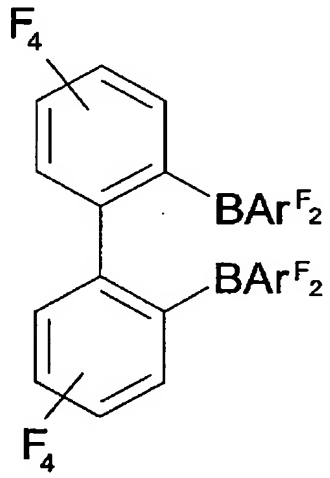
32. (original) The method of claim 28, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

33. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F{}_2 = C_{12}F_8$ as a coinitiator in the presence of water.

34. (original) The method of claim 33, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

35. (original) The method of claim 33, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

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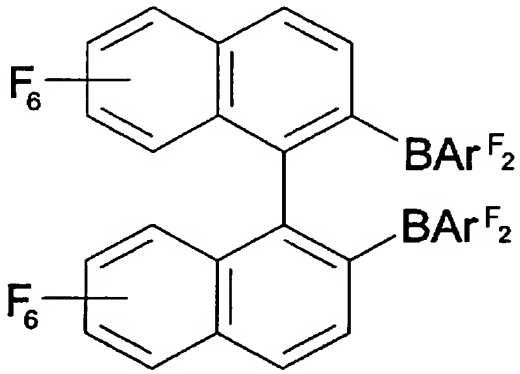
36. (original) The method of claim 33, wherein the olefin monomer is isobutene.

37. (original) The method of claim 33, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

38. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F{}_2 = C_{12}F_8$ as a coinitiator in the presence of water.

39. (original) The method of claim 38, wherein the olefin monomer is selected from the group consisting of:

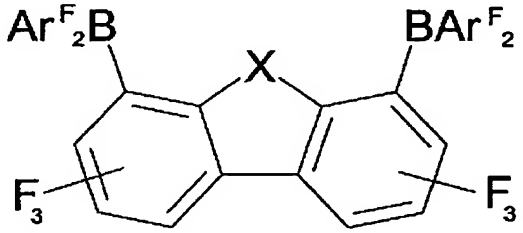
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

40. (original) The method of claim 38, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

41. (original) The method of claim 38, wherein the olefin monomer is isobutene.

42. (original) The method of claim 38, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

43. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein X = CH_2, NR, or O and $Ar^F = C_6F_5$ or $Ar^F_2 = C_{12}F_8$ as a coinitiator in the presence of water.

44. (original) The method of claim 43, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

45. (original) The method of claim 43, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

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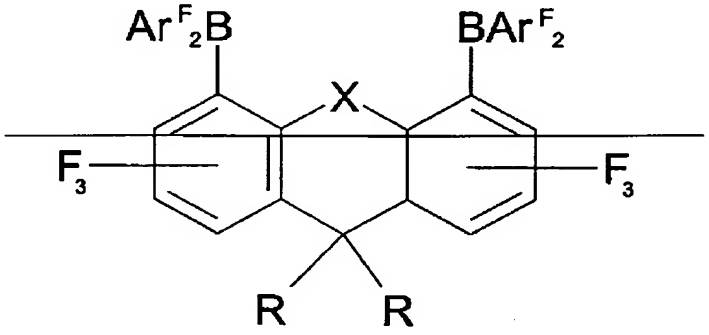
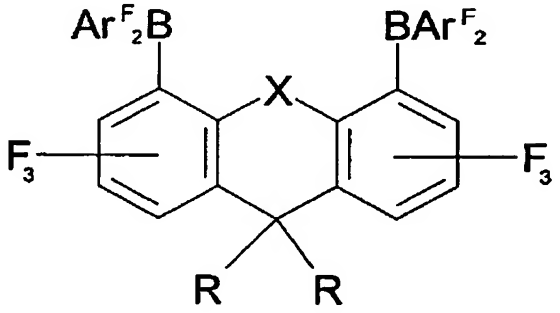
46. (original) The method of claim 43, wherein the olefin monomer is isobutene.

47. (original) The method of claim 43, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

48. (currently amended) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:





wherein X = CH_2, NR, or O and Ar^F = C_6F_5 or Ar^F_2 = $C_{12}F_8$ as a coinitiator in the presence of water.

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49. (original) The method of claim 48, wherein the olefin monomer is selected from the group consisting of:

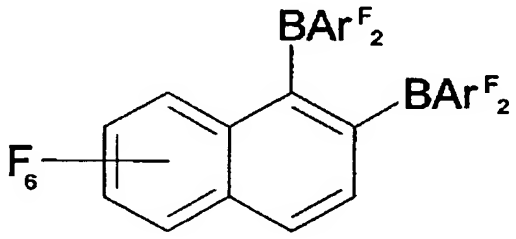
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

50. (original) The method of claim 48, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

51. (original) The method of claim 48, wherein the olefin monomer is isobutene.

52. (original) The method of claim 48, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

53. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F{}_2 = C_{12}F_8$ as a coinitiator in the presence of water.

54. (original) The method of claim 53, wherein the olefin monomer is selected from the group consisting of:

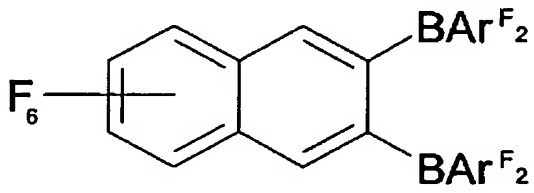
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

55. (original) The method of claim 53, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

56. (original) The method of claim 53, wherein the olefin monomer is isobutene.

57. (original) The method of claim 53, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

58. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F{}_2 = C_{12}F_8$ as a coinitiator in the presence of water.

59. (original) The method of claim 58, wherein the olefin monomer is selected from the group consisting of:

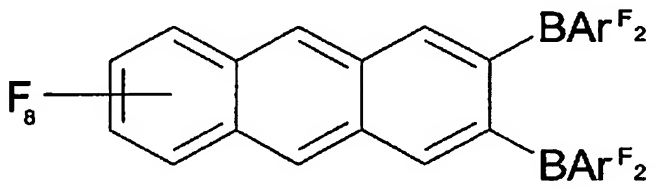
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

60. (original) The method of claim 58, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

61. (original) The method of claim 58, wherein the olefin monomer is isobutene.

62. (original) The method of claim 58, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

63. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F=C_6F_5$ or $Ar^F{}_2=C_{12}F_8$ as a coinitiator in the presence of water.

64. (original) The method of claim 63, wherein the olefin monomer is selected from the group consisting of:

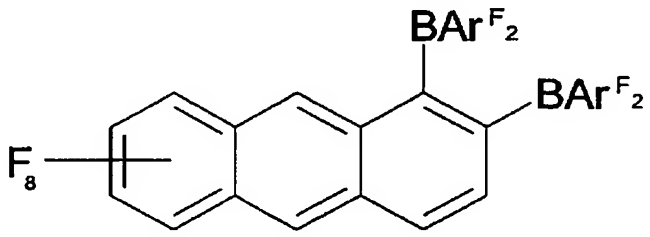
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

65. (original) The method of claim 63, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

66. (original) The method of claim 63, wherein the olefin monomer is isobutene.

67. (original) The method of claim 63, wherein the coinitiator is used In an aqueous suspension or aqueous emulsion polymerization process.

68. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F{}_2 = C_{12}F_8$ as a coinitiator in the presence of water.

69. (original) The method of claim 68, wherein the olefin monomer is selected from the group consisting of:

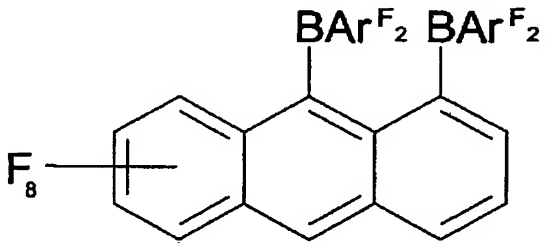
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

70. (original) The method of claim 68, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

71. (original) The method of claim 68, wherein the olefin monomer is isobutene.

72. (original) The method of claim 68, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

73. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F_2 = C_{12}F_8$ as a coinitiator in the presence of water.

74. (original) The method of claim 73, wherein the olefin monomer is selected from the group consisting of:

ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene,

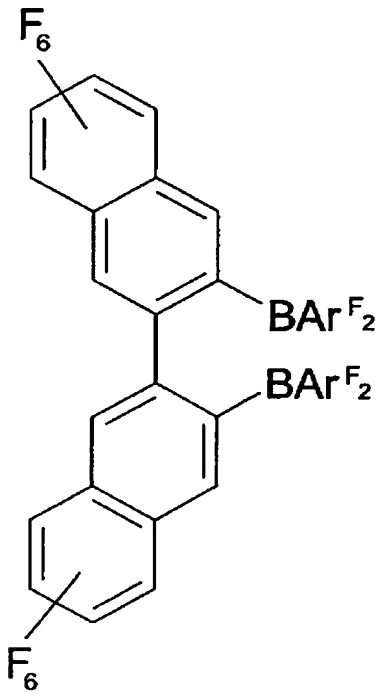
2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

75. (original) The method of claim 73, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

76. (original) The method of claim 73, wherein the olefin monomer is isobutene.

77. (original) The method of claim 73, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

78. (original) A method for cationically polymerizing olefin monomers comprising the step of using a composition having the chemical structure:



wherein $Ar^F = C_6F_5$ or $Ar^F{}_2 = C_{12}F_8$ as a coinitiator in the presence of water.

79. (original) The method of claim 78, wherein the olefin monomer is selected from the group consisting of:

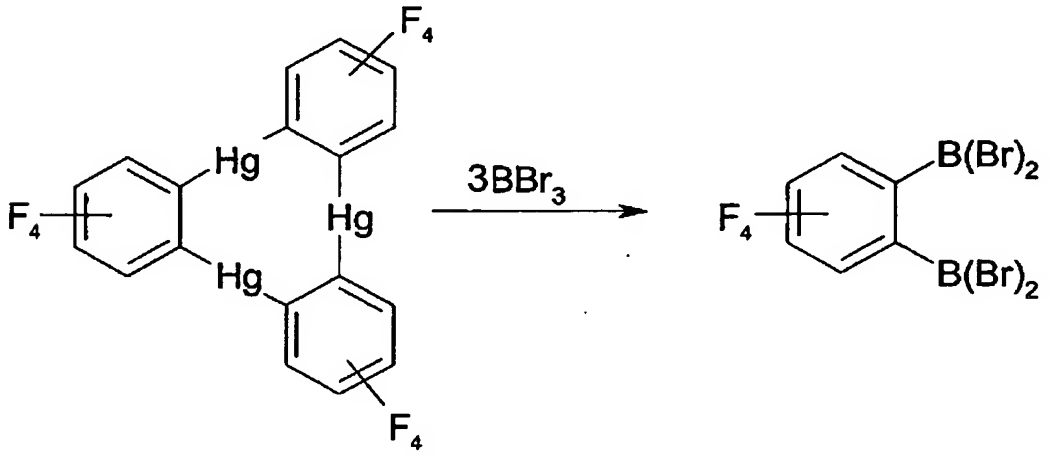
ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene, 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

80. (original) The method of claim 78, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

81. (original) The method of claim 78, wherein the olefin monomer is isobutene.

82. (original) The method of claim 78, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.

83. (original) A method comprising the step:



wherein the step is performed at a temperature less than about 35°C.

84. (original) The method of claim 83, wherein the step is performed at a temperature less than about 25°C.

85. (new) A method for cationically polymerizing olefin monomer comprising the step of using a composition having the chemical structure:

$$R_2Y–R'–YR_2$$

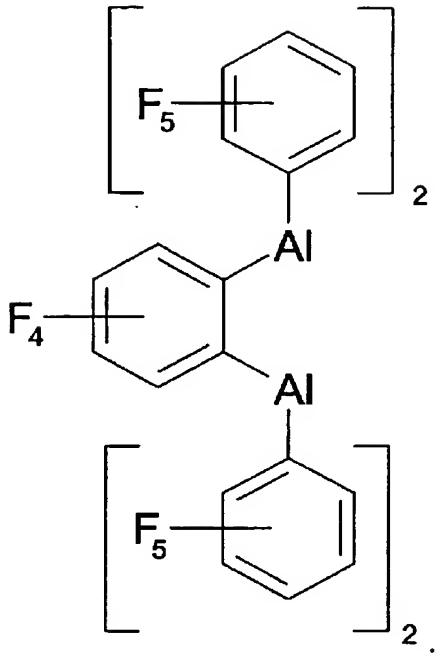
as a co-initiator in the presence of water;

wherein Y is aluminum; wherein each R is independently selected from the group consisting of a perfluorophenyl; 3,5-bis(trifluoromethyl)phenyl; 1-perfluoronaphthyl; 2-perfluoronaphthyl; 2-perfluorobiphenyl; 3-perfluorobiphenyl; 4-perfluorobiphenyl; and p-R''_3Si-2,3,5,6-tetrafluorophenyl;

wherein R' is 1,2-perfluorophenylenyl; 1,2-perfluoronaphthalenyl; 2,3-perfluoronapthalenyl; 1,8-perfluoronaphthalenyl; 1,2-perfluoroanthracenyl; 2,3-perfluoroanthracenyl; 1,9-perfluoroanthracenyl; 1,2-perfluorophenanthrenyl; 2,3-perfluorophenanthrenyl; 1,10-perfluorophenanthrenyl; 9,10-perfluorophenanthrenyl; 2,2'-perfluorobiphenylenyl; 2,2'-perfluoro-1,1'-binaphthalenyl; 3,3'-perfluoro- 2,2'-binaphthalenyl; or 1,1'-ferrocenyl; and

wherein R'' is a C_1, C_2, C_3, C_4, C_5, C_6, C_7, C_8, C_9, or C_{10} alkyl.

86. (new) The method of claim 85, wherein the chemical structure is:



87. (new) The method of claim 85, wherein the olefin monomer is selected from the group consisting of: ethylene, propylene, butene, pentene, hexene, heptene, octene, nonene, decene, dodecene, dodecyldocene; 3-methyl pentene, 3,5,5-trimethylhexene, isobutene, 2-methyl-butene, 2-methyl-pentene, vinyl ether, vinyl carbazole, isoprene, and combinations thereof.

88. (new) The method of claim 85, wherein the olefin monomer is a $C_2 - C_{30}$ olefin or a $C_2 - C_{30}$ diolefin.

89. (new) The method of claim 85, wherein the olefin monomer is isobutene.

90. (new) The method of claim 85, wherein the coinitiator is used in an aqueous suspension or aqueous emulsion polymerization process.